

You have 20 minutes to take this quiz. Each problem will be graded for clarity of work as well as correctness, so show all work **clearly and in order**. Circle or otherwise indicate your final answers. Please note that there are problems on both the front and the back of this page.

**1. (6 points) [Similar to #23, 7.4]**

A large helium balloon is being inflated at the rate of 100 cubic inches per second. How fast is the radius of the balloon increasing at the instant that the balloon has a radius of 12 inches?

*You may or may not need the following formulae: The volume of a sphere with radius  $r$  is  $\frac{4}{3}\pi r^3$ . The surface area of a sphere with radius  $r$  is  $4\pi r^2$ .*

**Show all work clearly! Setting up the problem (picture, what you are given, what you want to find) will be worth significant points.**

*Turn over for more...*

**2.** (8 points) [Similar to #6, #12, #32, 8.2]

Fill in the blanks.

(a)  $e^{\ln x} = \underline{\hspace{2cm}}$  for all  $x \in \underline{\hspace{2cm}}$ .

(b) Simplify:  $e^{4 \ln x} = \underline{\hspace{2cm}}$ .

(c) Write  $f(x) = 2(3^x)$  in the form  $Ae^{kx}$  for some  $A$  and  $k$ :  $\underline{\hspace{2cm}}$ .

**3.** (6 points) [Similar to #23, 8.1]

Solve the equation  $4^{x-3} = 2^x$  by hand. Do not use a calculator.